

# Investment as a Determinant of Per-Capita Income Growth in Nigeria: An Empirical Analysis

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## Abstract

This study investigates the impact of investment on long-run per-capita income growth in Nigeria within the period of 1970 and 2014. It also finds out other macroeconomic determinants of long-run output per-capita growth. The study employs the Ordinary Least Square (OLS) estimation technique to establish the links based on the sourced time series variables from the Central Bank of Nigeria (CBN). Empirical findings revealed that openness of trade has positive and significant impact on growth rate of per capita income in Nigeria. However, growth rate of capital as a percentage of GDP, government effectiveness measured by government expenditure to GDP and school enrolment rate have indirect relations with growth rate of per capita income of Nigeria. The central authority or law makers should effectively regulate and monitor the factors affecting per capita income growth in order to foster real sustainable growth. The study concludes that macroeconomic policies and stability indicators are not the only obstacle to convergence in real income and catch up growth.

**Keywords:** Per-capital income, investments, macroeconomic indicators, OLS, convergence.

## 1.0 INTRODUCTION

Over several decades in the past, government and investors (domestic and foreigners) in Nigeria have allocated large sums of money for investment in the real sector, yet the results on ground have been externally disappointing. Developing countries across the globe face a myriad of problems ranging from poor governance, poor programme implementation to corruption just to mention a few. The resultant effect of this is manifested in rising poverty levels, food insecurity, deplorable state of infrastructural facilities and a general poor service delivery system. Nigeria, the most populous country in Sub-Sahara Africa is blessed with enormous natural resources. Yet, poverty as at 1996 was 65.6% while the human poverty index stood at 41.6 percent (World Bank, 2012).

The provision of investment with rising interest rate and inflation rate, to meet the demands of economic agents caused by increasing population is one of the major problems of economic growth and development in Nigeria. Even, the ever increasing unemployment level in the country has caused serious social menace which consequently has increased the insecurity level in most parts of the nation. The availability of investment has increased geometrically in terms of government spending and private investment over the past several decades. In many cases, however, the impacts of previous investment both public and private have not been realized. This results to a serious waste of limited national resources and loss of economic opportunities.

The Nigerian economy has been plagued with several challenges over the years. Researchers have identified some of these challenges as: gross mismanagement and/or misappropriation of public funds, (Okemini and Uranta, 2008), corruption and ineffective economic policies (Gbosi, 2007); lack of integration of macroeconomic plans and the absence of harmonization and coordination of fiscal policies (Onoh, 2007); inappropriate and ineffective policies (Anyanwu, 2007). Imprudent public spending and weak sectoral linkages and other socioeconomic maladies constitute the bane of rapid economic growth and development (Amadi and Essi, 2006). It is evident that one of Nigeria's greatest problems today is the inability to efficiently manage her enormous human and material endowment. In spite of many, and frequently changing, economic stabilization policies, Nigeria has not been able to harness her economic potentials for rapid economic development (Ogbole, 2010).

The extensive reform towards stabilizing the Nigeria economy embarked upon by the central authority as part of SAP in 1987 including liberalizing interest and exchange rates, promoting a market-based system of credit allocation, enhancing competition and efficiency in the financial system and strengthening the regulatory and supervisory framework, have in the past been accompanied by inflation and sometimes, increase in the number of financial institution (especially banks) having problems. These cause worries that undesirable phenomena may have arisen probably due to the improper timing or wrong sequencing of the reforms. On this basis, this

study investigates the impact of investment and other macroeconomic factors on per-capita income growth in Nigeria between 1970 and 2014.

The remaining section of this study is divided into four parts. Section two discusses theoretical framework and literature review. Section three illustrates the theoretical framework employed and also specifies the model to explain the variable determinants of per-capita income in Nigeria. Section four gives the empirical results and discussion of findings and the last section would not only proffer policy recommendations but also conclude the study.

## 2.0 LITERATURE REVIEW

This study considers three theoretical thoughts with respect to growth theory in the last 50 years. The Harrod-Domar (1946) model is used to explain an economy's growth rate in terms of the level of saving and productivity of capital. It suggests that there is no natural reasons for an economy have balanced growth. The theory presupposed that growth rate depended on a country's saving rate, capital output ratio and capital depreciation. This implies that every economy must save a certain proportion of its national income, if only to replace worn-out or impaired capital goods (building, equipment, and materials). However, in order to grow, new investments representing net additions to the capital stock are necessary. It follows that any net additions to the capital stock in the form of new investment either in human resources or other form of productive investment will bring about corresponding increases in the flow of national output.

Moreover, the neoclassical (Solow) model. Solow's model describes a developed economy better than a developing one, it remains a basic reference point for the literature on growth and development. It implies that economies will conditionally converge to the same level of income, given that they have the same rates of savings, depreciation, labour force growth, and productivity growth. The key modification from the Harrod-Dorman growth model, considered above, is that the Solow model allows for substitution between capital and labour. In the process, it assumes that there are diminishing returns to the use of these inputs.

The endogenous growth model, also known as the new growth theory or Solow-Swan growth model is a term used to sum up the contributions of various authors to a model of long-run economic growth within the framework of neoclassical economics. The neo-classical model was an extension to the Harrod-Domar (1946) model that included a new term, productivity growth. It was developed in the 1980s as a response to criticism of the neo-classical growth model. The endogenous growth theory holds that policy measures can have an impact on the long-run growth rate of an economy. For example, subsidies on research and development or education increase the growth rate in some endogenous growth models by increasing the incentive to innovate. Endogenous growth theory tries to overcome of Solow's model by building macroeconomic models out of microeconomic foundations. Households are assumed to maximize utility subject to budget constraints while firms maximize profits. Crucial importance is usually given to the production of new technologies and human capital.

Mathur (2003) gives the theoretical justification for the per capita growth equations using Solovian model (1956) and its factor accumulation assumptions. He used the different forms of the per capita growth to test for 'conditional convergence' hypotheses and also work out the speed of conditional convergence for EU, East Asian and South Asian regions together from 1961-2001. Findings reveal that conditional convergence is prevalent among almost all pairs of regions in our sample except East Asian and South Asian nations together. Also, speed of conditional convergence ranges from 0.2 % in a year to 22%. The author concluded that countries that are poor relative to their own steady state do tend to grow more rapidly.

Charles, Darne & Hoarau (2009) investigated the possible presence of stochastic convergence of real per capita GDP for a set of Eastern and Southern African countries that are all members of COMESA trade agreement. Using the panel unit root test technique, they found that there was no stochastic convergence in real per capita GDP in COMESA economies. They made further attempts to identify the possible club convergences within the COMESA trade agreements using the following criteria: (1) the membership to another regional agreement, (2) the economic structure (dependence on oil production), and (3) the degree of global economic development. Two interesting results emerged from the latter analysis: first, they did not find any evidence of absolute and conditional  $\beta$  convergence for the countries belonging to the regional economic agreement and economic structure criterion. Secondly, they found a tendency of absolute per capita GDP convergence for two clubs within COMESA: (a) among better developed economies- Seychelles, Mauritius, Egypt and Libya and (b) among the least developed countries (LDCs). This implies that most of the COMESA member countries were converging to the bottom and were still held in vicious circle of poverty.

Wolassa (2011) investigates convergence in real per capita GDP and macroeconomic policy and stability indicators within the Southern African Development Community. Empirical tests for the period 1992-2009 showed no evidence of absolute beta and sigma convergence in real per capita GDP among the SADC economies. The author suggest that the absence of convergence does not necessarily imply lack of economic growth, further empirical assessment of possible conditional beta convergence did not reveal any tendency of convergence to own steady states. The findings indicate that most of the economies of the member states have shown a tendency of macroeconomic divergence in 2009 in monetary policy, fiscal policy, and foreign exchange reserve ratios. Since member countries are at varied levels of economic development, the goals themselves must be conditional on the level of convergence in economic structure and hence macroeconomic convergence may not be attainable.

Somasekharan, Prasad & Roy (2011) tested the convergence hypothesis in per capita agricultural output and food grains productivity across the major 15 states of India within 1971-2007. Empirical review shows that there is no evidence of beta convergence during 1971-88. On excluding West Bengal from the analysis, they observed a weak divergence, where states with higher initial per capita output enjoyed higher growth rates. They stated further that Gujarat, Bihar and Orissa have experienced negative growth rates during 1988-1998. It was also observed a clear convergence after excluding these states.

Wahiba (2015) studies the conditional convergence hypothesis among African countries that belonging to the West African Economic and Monetary Union (WAEMU). The author treats the effect of convergence, stability and growth pact on the convergence dynamics, by considering control variables comprising: the share of investment in gross domestic product the enrolment and the opening ratio, the study showed that these variables contribute to the revival of economic growth in the region. The author employed two estimation technique: within and system generalized method of moment, for the period 2000-2012. He concluded that the pact has contributed to real convergence of countries.

A study in China by Pedroni and Yao (2006) showed that the long-term effect of economic openness is a divergence of economies, in the sense that regional income diverged in China at the same time that the country has opened these economies for a large international business. Akanni (2003) studies economic convergence in developing countries, members of an integration, the author stated that convergence is not assured and timeliness of growth effects are extremely long, more than a few decades. Indeed, there are many studies that show the negative impact of globalization, particularly in terms of increasing disparities and divergence among nations.

Kalbasi (2010) used fixed effect models to test the hypothesis of convergence among Middle East Countries for the period of 1995-2005. The author tested for both absolute and conditional convergence using both GDP and per capita income. He also divided countries into two sub-groups, oil producing countries and non-oil producers, to see whether convergence exists within both group and whether the speed of convergence is different. The results support the existence of convergence for the per capita income but not for the GDP growth. Also, it was found that the absolute convergence is rejected for non-oil producers when we used GDP growth. His conclusion suggests that though there is a tendency of convergence among Middle East countries, the speed of convergence is different for oil producers compared with non-oil producers.

Rasmidatta (2011) examined the relationship between domestic saving and economic growth and tests the convergence hypothesis in Thailand within 1960 to 2010. He tested whether or not Thailand is in the process of convergence, catching up, lagging behind, loose catching up, loose lagging behind or divergence over time compared with other developed countries. The result of Granger Causality report that economic growth rate does matter lead to growth rate of domestic savings in Thailand only. The study also examine whether saving does help support convergence hypothesis for Thailand or not, which shows that domestic saving growth rate does not help narrowing the range of different of income of Thailand and Singapore which mean that domestic saving growth rate does not support the convergence hypothesis in Thailand.

Li and Zhou (2011) study the absolute and conditional convergence of real GDP per capita among 164 world economies over the sample period of 1970-2006. The data-driven model specification tests justify the use of nonparametric and semi-parametric models. The estimation results show that control variables play a negative/positive channel effect in the growth convergence for poor/developed economies. The absolute convergence hypothesis tends to hold only for the economies with low development levels, but the conditional convergence hypothesis tends to hold for all the economies.

### 3.0 MODEL SPECIFICATION AND ESTIMATION TECHNIQUES

This section presents the methodological description for investigating the relationship between investment and long-run per-capita income growth in Nigeria between 1970 and 2014. In reality countries are differently endowed and their growth patterns can also be different. We intend to adapt the Solow growth model using Cobb-Douglas production function with constant returns to scale as follows:

$$Y_t = K_t^\alpha (A_t L_t)^{1-\alpha} \quad (3.1)$$

Where  $Y$  = output,  $K$  = capital,  $L$  = labour,  $A$  = Total Factor Productivity.

The steady state level of per capita income  $y^*$  is given by:

$$y^* = A^{s/g} [s/(n + g + \delta)]^{\alpha/(1-\alpha)} \quad (3.2)$$

Where  $s$  is the investment rate,  $\delta$  is consumption of fixed capital,  $n$  and  $g$  are exponential growth rates of  $A_t$  and  $L_t$  respectively (Islam, 2003).

The model states that a country's steady state growth levels depend on a number of factors:  $A_0$ ,  $s$ ,  $n$ ,  $g$ ,  $\delta$ , and  $\alpha$ . Unconditional convergence occurs when all these factors are the same for countries. This may occur in countries at similar initial levels of income and with similar economic, political and social structures leading to  $\sigma$ -convergence or club-convergence (Varblane and Vahter, 2005).

In line with Baumol (1986) and Baro and Sala-i-Martin (1992, 1995) the bulk of the tests of convergence hypothesis have involved fitting cross-country regressions. This study use time series data to investigate the convergence hypothesis in Nigeria. Following Sala-i-Martin (1995) and Wolassa (2011), this study specifies the following regression equation to measure absolute  $\beta$ -convergence in Nigeria.

$$y_t = \alpha_0 + \beta_1 y_{t-1} + \mu_t \quad (3.3)$$

Where  $y_t$  is the logarithm of real GDP per capita at time  $t$ , and  $\mu_t$  is an error term at time  $t$ . A negative correlation between growth rates and the initial per capita income in these regressions implies absolute convergence.

The modified conditional convergence adapted from Wolassa (2011) is specified as follows:

$$\log y_t = \alpha_0 + \beta_1 \log k_t + \beta_2 \log(gexp_t) + \beta_3 \log(top_t) + \beta_4 \log(enrl_t) + \mu_t \quad (3.4)$$

Where  $y_t$  = the real GDP per capita,  $k$  = capital proxy by gross fixed capital formation,  $gexp$  = government effectiveness measured by government expenditure to GDP,  $top$  = trade openness proxy by total trade to GDP,  $enrl$  = the school enrolment rate,  $\alpha_0$  = constant,  $\beta_{1-4}$  = slopes, and  $\mu_t$  = error term.

The a priori expectation provides expected signs and significance of the values of the coefficient of the parameters under review on the part of the empirical evidence and theoretical assertions. The data are sourced from Central Bank of Nigeria (CBN) statistical Bulletin, Volume 25, 2014. All the incorporated variables in the modified model are expected to contribute to real economic growth positively. The unrestricted Ordinary Least Square (OLS) is used in estimating the multiple regression model. The estimated parameters are subjected to evaluation by using the student t-statistic test and F-statistic test. While, the overall stability of the specified empirical model is tested using multiple co-efficient of determination ( $R^2$ ), adjusted  $R^2$  and Durbin-Watson test.

### 4.0 DATA ANALYSIS AND INTERPRETATION

The long-run estimates using the ordinary least square (OLS) method for the model is presented in **Table 4.1**. Table 4.1 reported that the growth rate of trade openness proxy by total trade to GDP (TOP) has positive significant impact on growth rate of per capita income (PCI), and these conform with theoretical expectation. It implies that a 10% change in trade openness proxy by total trade to GDP (TOP) enhance the growth rate of per capita income (PCI) by 0.22%. Trade openness has significant impact on per capita income growth at 5% significance level.

In addition, the table 4.1 shows that the growth rate of capital as a percentage of GDP ( $k$ ), government effectiveness measured by government expenditure to GDP (GEXP) and school enrolment rate (ENRL) have indirect relations with growth rate of per capita income (PCI) of Nigeria. In magnitude terms, this implies that for a 10% growth in capital as a percentage of GDP ( $k$ ), government effectiveness measured by government expenditure to GDP (GEXP) and school enrolment rate (ENRL); the per capita income growth of the Nigerian economy deteriorates by 0.11%, 4.94% and 0.41% respectively. Capital as a percentage of GDP ( $k$ ) and

government effectiveness measured by government expenditure to GDP (GEXP) were found to be significant at 5%, while school enrolment rate (ENRL) was insignificant at both 5% and 10%.

**Table 4.1:** Result for Long-run Estimates

Dependent Variable:  $\log(y)$

Method: Least Squares

Sample (adjusted): 1970 2014

Included observations: 44 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.14781	8.003993	1.267843	0.2128
Log(K)	-0.011014	0.003211	-3.430084	0.0000
Log(GEXP)	-0.493790	0.248816	-1.984557	0.0546
Log(TOP)	0.021964	0.006253	3.512554	0.0000
Log(ENRL)	-0.041129	0.148150	-0.277621	0.7828
R-squared	0.634136	Mean dependent var		1.231469
Adjusted R-squared	0.501387	S.D. dependent var		7.339549
S.E. of regression	7.152250	Akaike info criterion		6.901519
Sum squared resid	1892.723	Schwarz criterion		7.147268
Log likelihood	-142.3827	Hannan-Quinn criter.		6.992143
F-statistic	144.5709	Durbin-Watson stat		2.020927
Prob(F-statistic)	0.000708			

\*significant at 1%; \*\* significant at 5%; \*\*\* significant at 10%

Source: Authors' computation (2016).

The F-statistic result shows that all the incorporated per capita income growth and macroeconomic indicators are simultaneously significant at 5% critical level. Also, the adjusted R-squared result reveals that 50.2% of the total variation in output per capita growth is accounted by changes in trade openness proxy by total trade to GDP (TOP), capital as a percentage of GDP ( $k$ ), government effectiveness measured by government expenditure to GDP (GEXP) and school enrolment rate (ENRL) during the reviewed periods. The Durbin-Watson test result reveals that there is presence of semi-strong positive serial correlation among the residuals, because of the d-value (2.0209) is approximately two. The model is not spurious since R-square is lesser than Durbin-Watson value.

## 5.0 CONCLUSION

Emanating from the research findings, it can be deduced that investment and other macroeconomic determinants dictates the movement of per capita income growth, and some of these key variables are the significant determinants of income growth in Nigeria during the reviewed period. Specifically, trade openness, capital as a percentage of GDP and government effectiveness have significant impact on per capita income growth at 5% significance level; first lag of real GDP per capita and school enrolment rate (ENRL) were found to be insignificant at both 5% and 10% critical level. However, the precise link or causality between investment, macroeconomic indicators and per capita income growth is not yet known from this study and this will serve as a gap to be filled for other future studies on Nigerian economy. In order to eliminate the bottleneck associated with achievement of long-run income growth in Nigeria, this research study recommends the following policy outlooks:



- I. The central authority or law makers should effectively regulate and monitor the factors affecting per capita income growth in order to foster real sustainable growth.
- II. Since Nigeria is at varied levels of economic development, the goals themselves must be conditional on the level of convergence in economic structure and hence macroeconomic convergence may not be attainable. Furthermore, achieving the targets may be neither necessary nor sufficient to achieve good macroeconomic outcomes.
- III. Macroeconomic policies and stability indicators are not the only obstacle to convergence in real income and catch up growth. Low savings and investment, shortages of high level skills, high level of unemployment, inadequate and sub standard infrastructure, insignificant production and manufacturing capability, and inadequate and unreliable development support from donor agencies to poorer member states all contribute to slow economic growth and lack of convergence in real per capita GDP. The Nigeria economy needs to urgently address these challenges in order to achieve deeper economic integration and catch up with the more developed economies in the sub region and the rest of the world.

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